

Oct. 12, 1971

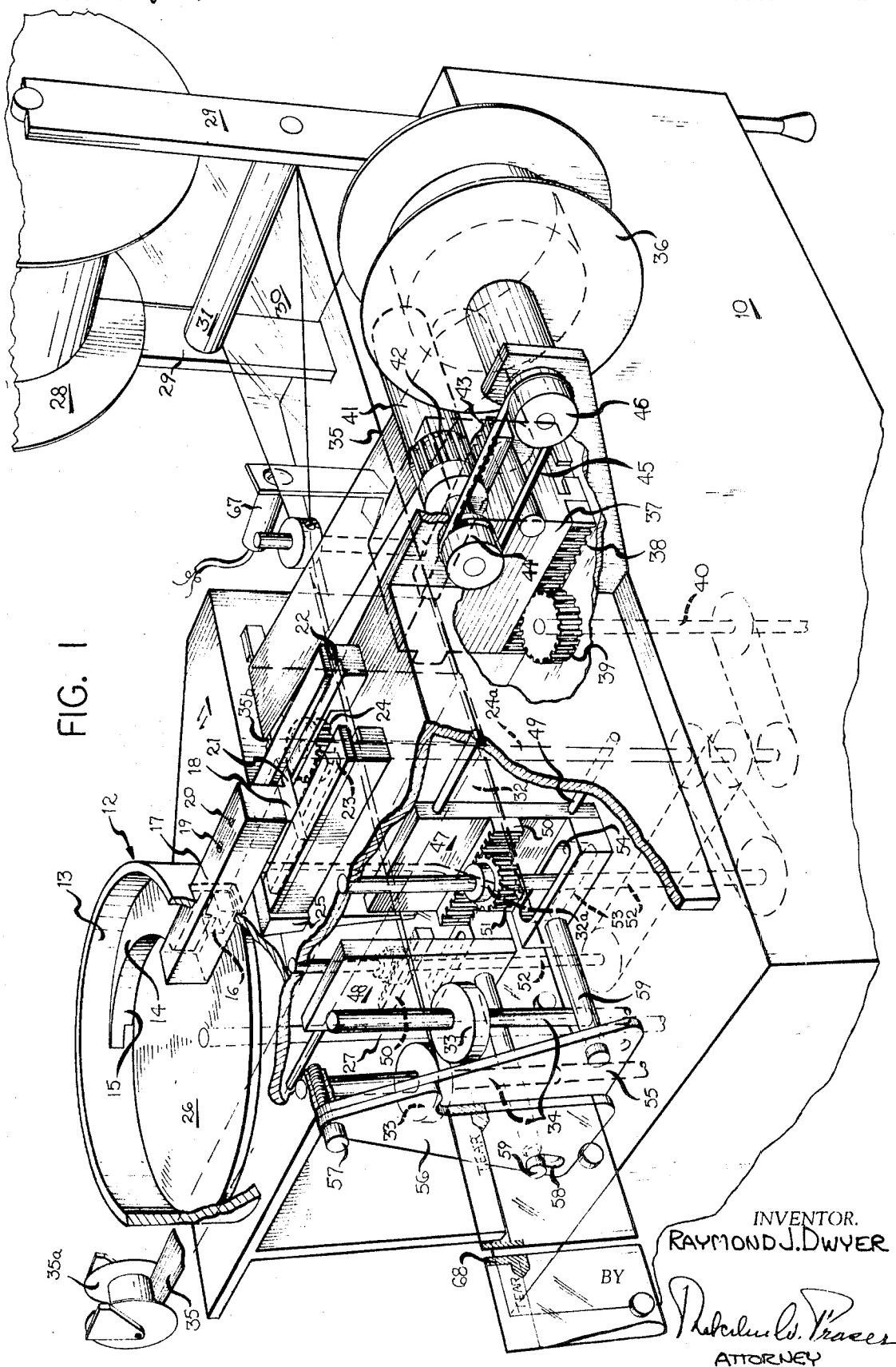
R. J. DWYER

3,611,658

MACHINE FOR PACKAGING ARTICLES, SUCH AS TABLETS AND CAPSULES

Filed July 22, 1969

4 Sheets-Sheet 1



Oct. 12, 1971

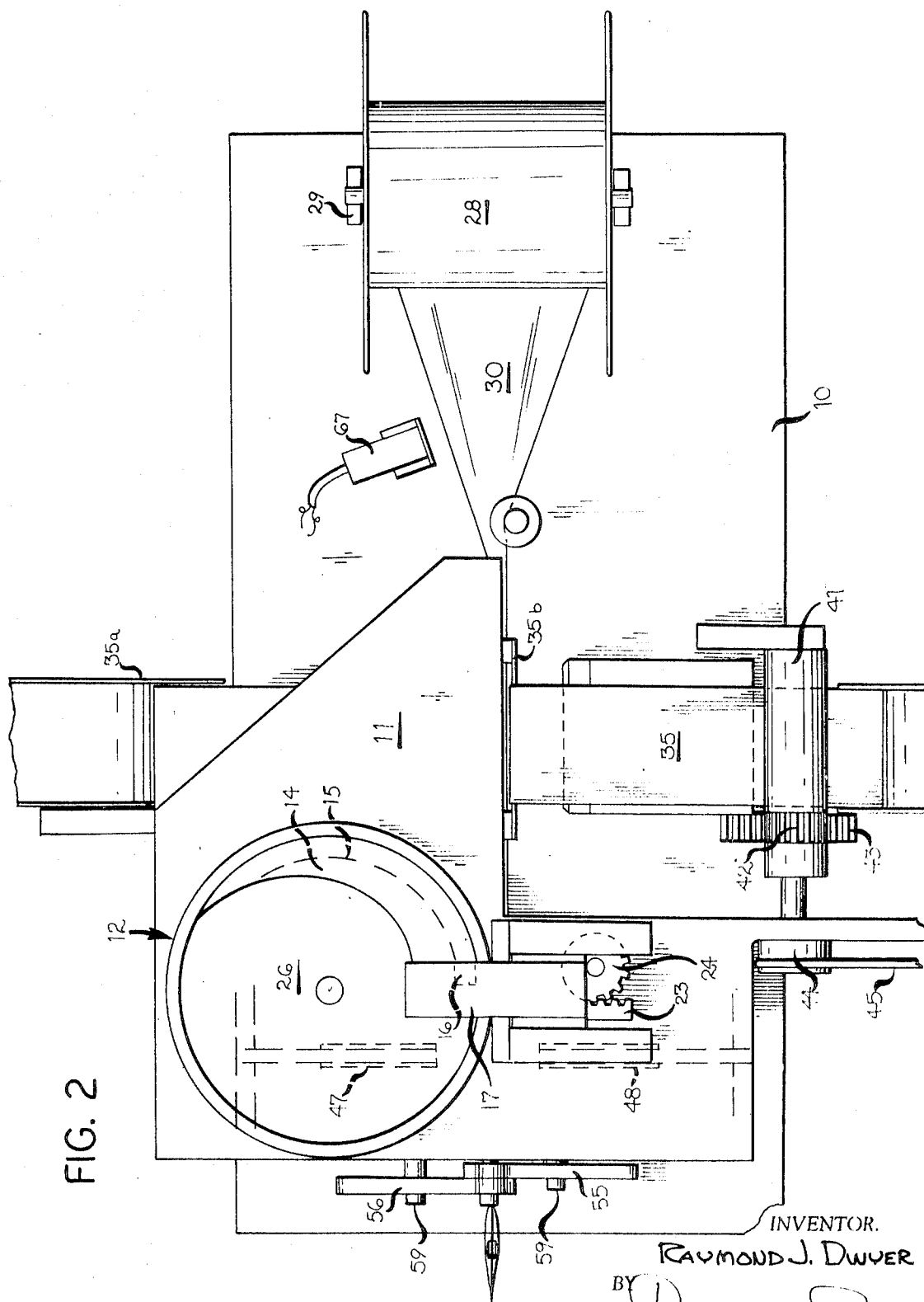
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MACHINE FOR PACKAGING ARTICLES, SUCH AS TABLETS AND CAPSULES

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

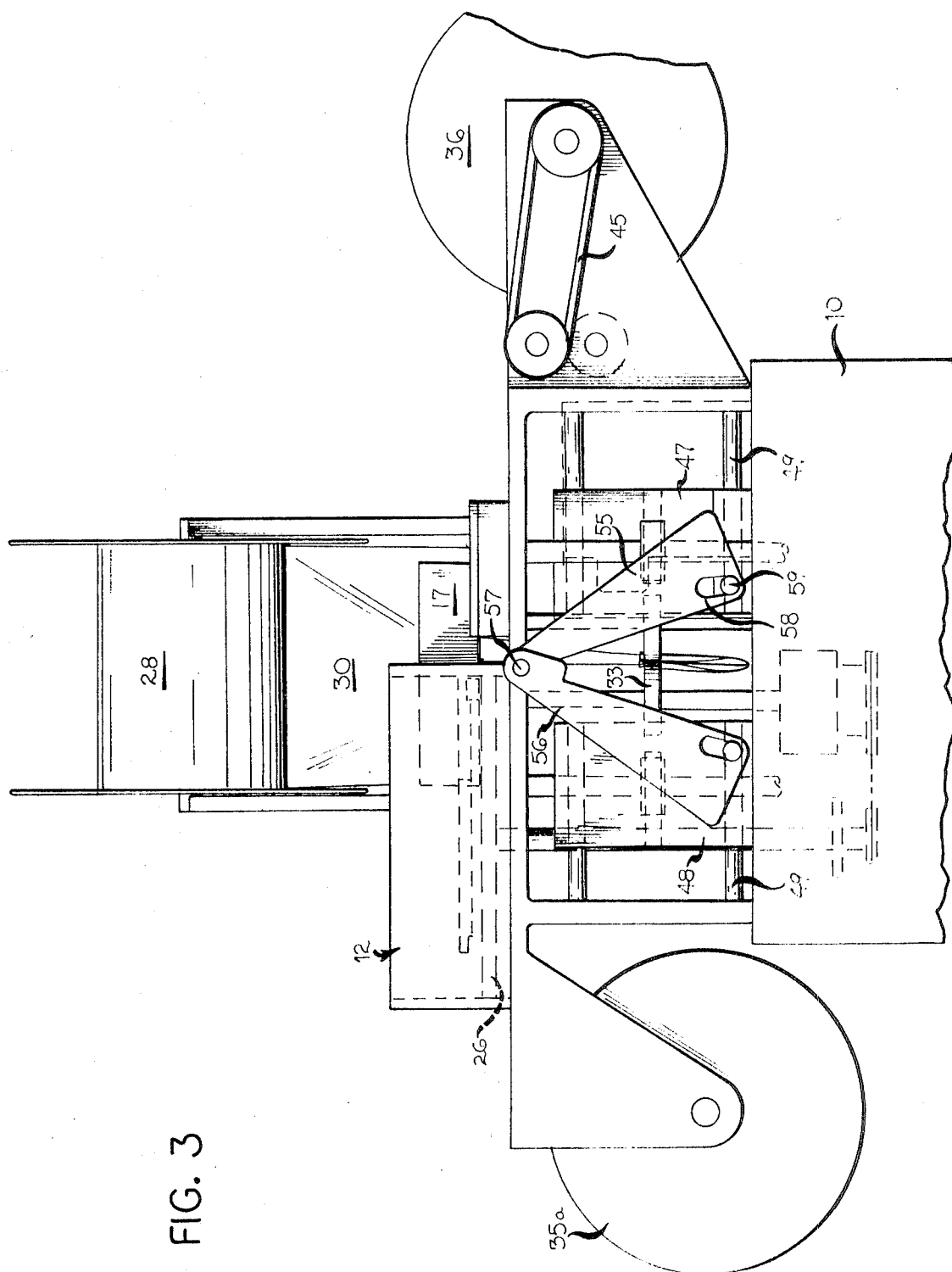


FIG. 3

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4 Sheets-Sheet 4

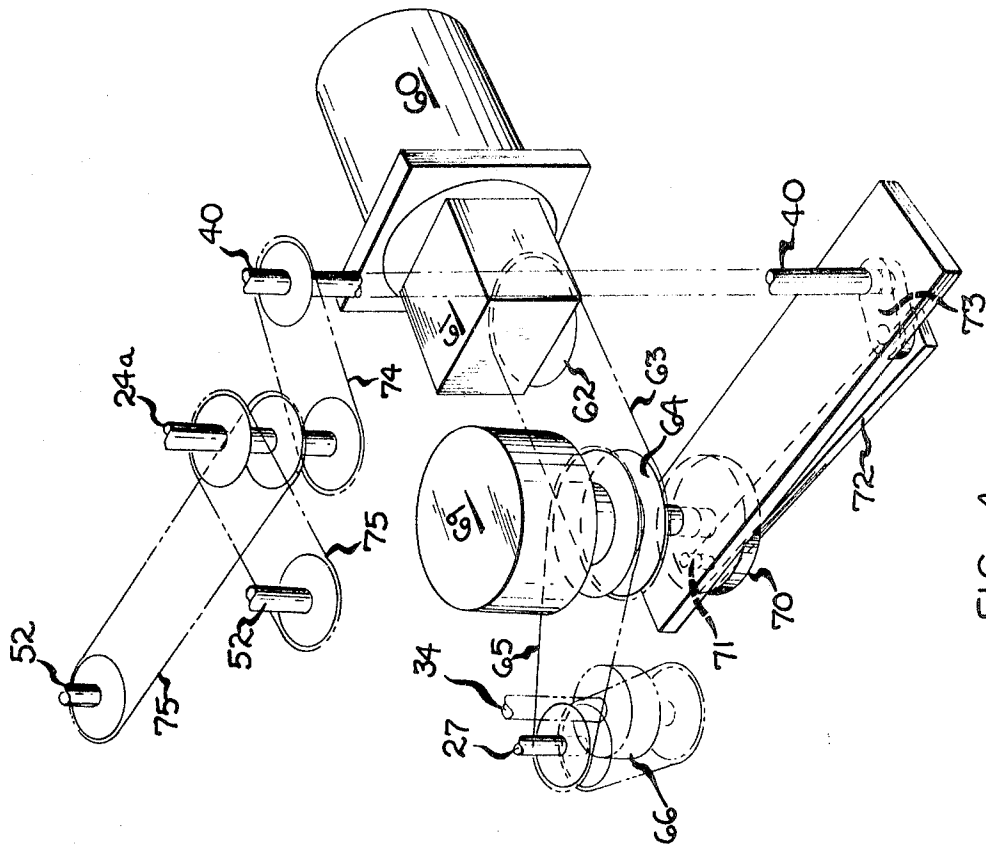


FIG. 4

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3,611,658

MACHINE FOR PACKAGING ARTICLES, SUCH AS TABLETS AND CAPSULES

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10 Claims

ABSTRACT OF THE DISCLOSURE

A machine for packaging articles, such as tablets and capsules containing medicines, drugs, etc., in envelopes or receptacles of flexible sheet material, as for example cohesive pressure sensitive sheet material. The tablets or capsules are delivered to a hopper, the bottom of which consists of a rapidly rotating disc which centrifugally forces the pills into a row leading to a feeder, which operates recurrently to deliver a predetermined number of pills to an envelope or enclosure as it is being formed. The sheet material is advanced step by step and during the intervals it is printed to indicate the contents, is sealed to provide a self sustaining package and optionally may be severed to provide individual units.

BACKGROUND OF THE INVENTION

It is of utmost importance in hospitals that pills be clearly identified to obviate any chance that a patient will be given the wrong medicine. This has been accomplished by placing the pill in an envelope on which the identification is given, but this is extremely time consuming and is subject to error. It is therefore a desideratum to provide a simple and inexpensive machine, which will not only package pills in individual sealed receptacles or packages of sheet material suitable for a single dose, but to display thereon the name or clear identification of the contents, thereby to obviate errors of identification and insure that the proper pill is furnished to the patient.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an upper perspective view with some parts broken away for purpose of clarity showing a machine for making a series of article-containing packages of sheet material;

FIG. 2 is a plan view of the machine shown on FIG. 1;

FIG. 3 is a front end elevation of the machine; and

FIG. 4 is a perspective view of the drive for the different parts of the machine.

DESCRIPTION OF PREFERRED EMBODIMENT

The illustrated embodiment of the invention comprises a housing 10 which is provided with an elevated portion having a flat top 11. Resting on the top 11 is a pill hopper 12 of suitable molded plastic material. The hopper 12 has a vertically disposed circular wall 13 and is open at the top and bottom. Formed in the hopper and connected to the inside of the wall 13 is a feed web 14 which extends approximately one-half the internal circumference of the hopper and is of gradually increasing width. The feed web 14 is provided with an arcuate depending flange 15 which forms with the hopper wall 13 a pill guide having a discharge opening to feed pills or other small articles to a lateral notch or cavity 16 which has closed front, rear, and outer side walls and an open bottom wall. The cavity 16 is formed in an elongate plastic pill pusher or escapment 17 which reciprocates in an appropriately shaped hole in the hopper wall 13.

The pill pusher 17 is in the form of an elongate rectangular plastic block and is secured to an actuating slide 18 by a screw 19 and a pin 20. By removal of the screw

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19 and the pin 20, the pusher 17 can be removed from the slide 18 so that it can be replaced by another pusher for accommodating different size pills or a different number of pills. The pusher slide 18 has laterally extending guide flanges 21 which reciprocate in ways 22. Formed on the slide 18 is a rack bar 23 with which a pinion 24 meshes, the latter being carried by a vertically disposed pinion shaft 24a.

A pill chute 25 is disposed in position to receive the pills discharged from the pill pusher 17 when the latter advances, the chute directing the pills into the bag material as will hereinafter appear. The pills in the hopper 12 rest on a continuously rotating flat disc 26 which forms the bottom of the hopper, the centrifugal force created by the rotating disc forcing the pills into a row in the pill guide formed by the arcuate web or flange 15. The disc 26 is mounted on an operating shaft 27 which is vertically disposed and extends downwardly therefrom.

Endless sheet material to form pill-containing packages is wound upon a supply reel 28 which is rotatable on vertical brackets 29. The sheet material used in this connection is indicated at 30 and is a cohesive pressure sensitive material. From the reel 28 the sheet material passes around a guide roller 31 and is then formed into U-shape with the free ends of the material uppermost. The sheet material advances over a vertically disposed sheet guide and package forming plate 32 which depends from the housing and extends a substantial distance. The forward end of the guide plate 32 is disposed beneath the lower end of the pill chute 25 and is formed with a forwardly inclined cam end 32a against which the falling pills engage and cause them to be diverted forwardly into the proper position in the package. The web of sheet material is fed forwardly in an intermittent manner by a pair of feed rolls 33 arranged in advance of the pill chute 25 to engage opposite sides of the U-shaped web near the free edge portions. The feed rolls 33 are carried by vertically disposed drive shafts 34 respectively, and as will hereinafter appear the feed rolls are so operated so as to impart step by step movement to the sheet material 30.

During intervals in the advancing movement of the packaging material 30 the latter is printed so that each pill-containing package will bear a printed legend describing the particular pill it contains, thereby to insure that the patient will receive the exact pill prescribed. For this purpose a supply reel 35a contains a roll of printing tape 35. The tape 35 may be of any well known type, such as metal foil or other sheet material for printing purposes such as are well known to those skilled in the art. From the supply reel the printing tape 35 passes through a portion of the housing beneath the guide and forming plate 32, over guide rolls (not shown) and thence upwardly along one side of the U-shaped web of the sheet material 30, thence over a guide 35b and thence horizontally to a take-up reel 36.

A printing slide head or block 37 is horizontally slidable toward and away from the printing material 35 and it will be understood that the face of the slide block 37 carries the printing type and its forward movement engages the tape 35 and through it imprints or impresses the desired legend on the bag material 30. In this connection a Teflon coated rubber cushion (not shown) on the guide plate 32 provides a backing against which the slide block bears through the sheet material to effect the printing operation. On the slide block 37 is a rack 38 with which an actuating pinion 39 meshes, the latter being carried by vertically disposed shaft 40. The printing tape 35 is pulled by rollers 41, one of which has a pinion 42 which meshes with a rack 43 on the printer slide. On the shaft for the pinion 42 is a sheave 44 which is connected by a belt 45 to a sheave 46 on the shaft for the

reel 36. It will be understood that the pull rolls 41 are driven in response to movement of the printing head by means of a one-way clutch and the rack and pinion above described. Thus, in the advancing or work movement of the printing head 37 the pull rollers 41 do not operate but on the retracting movement of the slide block 37 the take-up reel 36 is operated through the connections described.

Also during intervals of the movement of the packaging sheet web 30 and in advance of the printing device, the U-shaped bag material which has received its pill is pressed together along a vertical line so that the pressure sensitive material coheres to close successively the ends of the bag. As above mentioned the free edge portions of the web are pressed together by the feed rolls 33. The vertical sealing device comprises slide blocks or members 47 and 48 adapted not only to seal but to provide a perforated line, if desired, the blocks being arranged respectively on opposite sides of the U-shaped web 30. These slide blocks reciprocate laterally on guide rods 49 and on each slide block is a horizontally disposed rack bar 50 with which pinions 51 mesh respectively, these pinions being carried by vertical operating shafts 52. On each of the slide blocks is a lateral extension 53 provided with an elongate slot 54 to accommodate the respective drive shafts 52. As will hereinafter appear, the slide blocks 47 and 48 recurrently move toward each other and squeeze the U-shaped sheet 30 between them for effecting the up and down seals of the package as well as vertical lines of perforation, these blocks being driven by racks 50 and pinions 51 in timed relation to the advancing movement of the packaging material.

From the above description, it will be manifest that as the pill pusher 17 reciprocates, one or more pills are dropped through the chute 25 into the folded sheet packaging material 30. One side of the packaging sheet material is recurrently printed to describe the contents of the package and consequently after the pill or pills have been disposed in place, the sealing blocks 47 and 48 operate first to seal the front vertical end of the package and then the rear vertical end, the top or free edge portions of the material being pressed into engagement by the feed rolls 30. Thus, the package containing the pill or pills constituting an individual dose, is complete and it may constitute a continuous succession of packages which can be separated along the lines of perforation or, if desired, cutting means operates to sever the packages from each other. Thus, the cutting means may or may not be used depending upon whether a continuous strip of packages is desired or whether separate packages are desired. If the continuous strip of packages is not desired, then it is necessary for one package to be separated along the perforated line from the adjacent packages.

Cutting mechanism is shown for severing the packages from each other and for this purpose a pair of cutter blades 55 and 56 are employed, and these blades are mounted on a common pivot pin 57 at the upper ends of the cutter blades. In each blade at the lower end is a vertically elongate slot 58 into which project pins 59 respectively. The pins 59 project forwardly from sealing blocks 47 and 48. Thus, when the sealing blocks 47 and 48 are advanced toward each other, then at that time the cutter blades 55, 56 are actuated for severing the pill-containing packages from the continuous web particularly as indicated on FIG. 1.

The drive for the operating parts above described originates in an electric motor 60 which operates through a gear reduction 61 to drive a sprocket wheel 62. The sprocket wheel 62 is connected by a chain 63 to a driven sprocket wheel 64. From the sprocket wheel 64 is a sprocket and chain connection 65 to the shaft 27 which drives the pill feeding disc 26 continuously. Thus, the drive to the shaft 27 is a continuous one. From the shaft 27 extends a sprocket and chain connection to a shaft having a magnetic clutch 66. When the magnetic clutch 66 is energized it drives the shaft 34 which actuates the feed

rolls 33 thereby to advance the packaging sheet material 30.

An electric eye 67 is disposed adjacent the commencement of the packaging material 30 and this electric eye scans black areas 68 on the packaging material 30. Thereupon through connections not shown the clutch 66 is de-energized and a magnetic clutch 69 is energized. The magnetic clutch 69 operates to connect the sprocket wheel 64 with a cam disc 70 mounted on the same shaft as the sprocket wheel 64. Thus, when the magnetic clutch 69 is energized, it connects the cam disc 70 with the power source as will be readily understood. On the cam disc 70 is a pin 71 to which one end of a link 72 is pivoted. The other end of the link 72 is connected to an arm 73 to which the vertical shaft 40 is fixed. From the shaft 40 a sprocket and chain connection 74 extends to the pill pusher shaft 24a. Additionally, a sprocket and chain connection 75 extends from the same shaft 74 to shafts 52 for actuating the sealing blocks 47 and 48. It will thus be apparent that after the magnetic clutch 66 is de-energized the magnetic clutch 69 is energized to impart one complete revolution to the disc 70. Such movement is sufficient through the connections described to effect operation of the pill pusher, sealing blocks and printing block, from the shaft 40 so that these parts all operate recurrently in intervals between advance of the web 30.

Throughout this application the word "pill" describes capsules or tablets since one or more of these may be deposited in the package. The hopper 13 as well as the pill pusher 17 can readily be replaced by others in accordance with the size of the pill as well as the number thereof desired in the package.

I claim:

1. An article-packaging machine comprising means for supporting a source of sheet material, means for advancing the sheet material, means for forming the sheet material into a U-shaped configuration, means for delivering a predetermined number of articles toward said U-shaped sheet material, a guide plate positioned so that the free ends of the U-shaped material will extend on each side of said guide plate, means for guiding a printing tape past one side of said guide plate, a printing head, means for moving said printing head in a path toward and away from said guide plate to engage the printing tape and form indicia on the U-shaped sheet material when the sheet material is at rest, guide means positioned to guide articles into space between the free ends of the material after the indicia is applied thereto, sealing members spaced from said guide plate, and means for causing said sealing members to engage the sheet material to seal the material along a transverse portion thereof.

2. An article-packaging machine comprising means for supporting a source of sheet material, means for advancing the sheet material, means for forming the sheet material into a U-shaped configuration, means for delivering a predetermined number of articles toward said U-shaped sheet material, a guide plate positioned so that the free ends of the U-shaped material will extend on each side of said guide plate, printing means positioned to one side of the path of the sheet material and movable transversely of the sheet material to apply indicia thereto when the sheet material is at rest, guide means positioned to guide articles into space between the free ends of the material after the indicia is applied thereto, two sealing members spaced from said guide plate, means for causing said sealing members to engage the sheet material to seal the material along a transverse portion thereof, means for severing the sealed sheet material into segments along lines generally bisecting the transverse sealed portions, said severing means comprising a pair of blades, means supporting said blades on opposite sides of the path of the U-shaped sheet material for movement toward and away from the sheet material, and positioned at least one package length from said sealing members, and a rigid member directly connecting each of said sealing members

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with the blade on the same side of the path of said sheet material to cause said blade to move toward and away from said sheet material with said sealing members.

3. A packaging machine according to claim 1 characterized by roller means for feeding the printing tape, and gear and clutch means connecting said roller means and said means for driving said printing head to cause said roller means to advance said printing tape when said printing head retracts.

4. A packaging machine according to claim 3 characterized by said gear and clutch means comprises a gear rack attached to said printing head and movable therewith, and a pinion engageable with said roller means and meshing with said gear rack.

5. In an article-packaging machine, means for gradually producing a succession of packages from an endless strip of sheet material and intermittently advancing same, means for delivering a predetermined number of articles to each package, said article-delivering means comprising a hopper having an article-receiving guide passage open at opposite ends for receiving a row of articles from the hopper, rotating means in the hopper for moving articles to said guide passage, and a feeder for recurrently feeding articles from the row to said packages and operating in timed relation to the movement of the latter, said feeder comprising a reciprocating slide having a lateral cavity disposed, when in position of rest, to be aligned with the row of articles in said guide passage, the bottom of said cavity being open thereby to allow articles to drop therefrom upon feeding movement of said slide.

6. An article-packaging machine according to claim 5, characterized by said hopper and said slide being replaceable with similar structures to accommodate different size articles or to vary the number thereof delivered to the package.

7. In an article-packaging machine, means for gradually producing a succession of packages from an endless strip of sheet material and intermittently advancing same, means for delivering a predetermined number of articles to each package, said package producing means comprising a vertical sheet guide and package former, the sheet passing over said guide in generally U-shaped form with the free edges of the sheet uppermost, said sheet being of a cohesive pressure-sensitive type, said package former terminating short of said article-feeding means, means for imparting step-by-step advancing movement to the sheet, means

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for sealing and perforating transverse regions of the U-shaped sheet, means for driving said sealing means during the intervals between the advancing movement of the sheet, said article-delivering means comprising a hopper having an article-receiving guide passage open at opposite ends for receiving a row of articles from the hopper, means in the hopper for moving articles to said guide passage, and a feeder for recurrently feeding articles from the row to the packages and operating in timed relationship with the movement of the latter.

8. An article-packaging machine according to claim 7 characterized by said advancing means for the sheet comprising rollers engaging the opposite sides of the free edge portions of the sheet in advance of said sealing means and of said article feeder, thereby not only to seal the free edge portions of the sheet but also to impart advancing movement thereto.

9. An article-packaging machine according to claim 8 characterized by means for printing on said sheet in such a manner that a legend appears on each package, and means for operating said printing means during intervals when the sheet is at rest.

10. An article-packaging machine according to claim 7 characterized by a forwardly-extending cam surface on the end of said guide and package former, said cam surface being positioned to enable articles falling from said feeder to contact said surface and be diverted into the forward portion of the package being formed.

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